

International Conference on Extended Finite Element Methods - XFEM 2011

June 29 – July 1, 2011, Cardiff, United Kingdom

S. Bordas, B. Karihaloo and P. Kerfriden

## ON THE USE OF RECOVERY TECHNIQUES FOR ACCURATE ERROR ESTIMATION AND ERROR BOUNDING IN XFEM

**J.J. Ródenas**

Centro de Investigación en Tecnología de Vehículos  
Universidad Politécnica de Valencia, E-46022-Valencia, Spain. [jjrodena@mcm.upv.es](mailto:jjrodena@mcm.upv.es)

**Octavio A. González-Estrada**

Research Associate, Institute of Modelling and Simulation in Mechanics and Materials,  
Cardiff School of Engineering, Cardiff University, Queen's Buildings,  
The Parade, Cardiff CF24 3AA Wales, UK, e-mail: [agestrada@gmail.com](mailto:agestrada@gmail.com)

**F. Javier Fuenmayor, Enrique Nadal**

Centro de Investigación en Tecnología de Vehículos. Universidad Politécnica de Valencia,  
E-46022-Valencia, Spain. [ffuenmay@mcm.upv.es](mailto:ffuenmay@mcm.upv.es), [ennaso@upvnet.upv.es](mailto:ennaso@upvnet.upv.es)

**Stéphane P.A. Bordas**

Institute of Modelling and Simulation in Mechanics and Materials, Cardiff School of Engineering,  
Cardiff University, Queens Buildings, The Parade, Cardiff CF24 3AA Wales, UK.  
[stephane.bordas@alum.northwestern.edu](mailto:stephane.bordas@alum.northwestern.edu)

**Key Words:** XFEM, error estimation, error bounding, recovery techniques

### ABSTRACT

*A posteriori* implicit residual-type estimators have traditionally been the most commonly used techniques to provide bounds of the error of the finite element method, FEM. Recovery-based error estimators based on the ideas of Zienkiewicz and Zhu have been often preferred by practitioners, due to their simple implementation and robustness, but they were unable to provide guaranteed bounds, which is especially desirable in the context of goal-oriented adaptivity. In 2007, Díez *et al.*[1] circumvented this problem by means of the use of a nearly statically admissible stress field and correction terms, proposing the first recovery-based technique used to evaluate upper bounds of the error in energy norm for FEM. Then, in 2010, Ródenas *et al.* [2] enhanced this technique and adapted it to the extended finite element method, XFEM. In this paper we will show: *a)* how these techniques can also be applied to obtain sharp upper bounds in *goal-oriented* error estimation; and *b)* new enhancements of the recovery technique that provide sharp upper bounds of the error in energy norm avoiding the use of correction terms. The numerical results show that these kind of techniques are a clear alternative to the use of residual-type estimators in error bounding.

### REFERENCES

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